State of Illinois
Department of Registration and Education
STATE GEOLOGICAL SURVEY DIVISION
John C. Frye, Chief

EARTH SCIENCE FIELD TRIP

GUIDE LEAFLET

HOMER AREA

CHAMPAIGN AND VERMILION COUNTIES

FITHIAN, DANVILLE NW, AND DANVILLE SW QUADRANGLES

Leader
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Urbana, Illinois
October 12, 1957

GUIDE LEAFLET 57E

HOST: HOMER COMMUNITY CONS. HIGH SCHOOL

STS

FIELD TRIP ITINERARY

0.0	0.0	Turn left entering highway, enter the town of Homer.
0.4	0.4	Stop, turn right. Entering Route 49 (south).
0.1	0.5	Caution, railroad crossing.
0.2	0.7	Slow, turn left (east).
0.7	1.4	Caution, rough bridge.
0.3	1.7	Slow, turn right (south).
1.0	2.7	Slow, turn left (east).
0.1	2.8	Crest of Urbana moraine.
0.2	3.0	Sub-glacial channel crossing road.
0.2	3.2	STOP NO. 1. Park along roadside.

This stop affords an opportunity to discuss the topography of east-central Illinois. As you know, the larger portion of Illinois has been glaciated by continental types of glaciers. In fact we know that glaciers have covered this portion of Illinois at three separate times; during the Kansan, Illinoian, and Wisconsin stages.

On the attached sheet you may note the many sub-stages or moraines that we find within the Shelbyville moraine.

Long ago, perhaps as much as a million years, the first of the great ice sheets began accumulating on the northern portion of North America. As the thickness of the ice continued to increase the ice sheet would spread out to the south, covering much of northern United States. We know that the mean annual temperatures were only a few degrees lower than they are at the present time. As a result the snow residue accumulated year after year until the ice began to flow outward, carrying with it the accumulated soil and rocks on which it rested and over which it moved. This process continued until the ice sheet could advance no further. In one instance the ice reached as far south as the Ohio River.

It is thought that moderation of temperatures caused the glacial advance. When the rate of advance equalled the rate of melting, the material brought to the edge of the ice accumulated to form a ridge of till called a moraine. We are standing on such a moraine and will see another moraine at a later time during the day.

When the rate of melting exceeded the rate of advance, the ice front retreated leaving behind the rocks and clay it had carried. These materials, called drift, formed a drift-plain or a till-plain, characterized by an almost level or slightly billowy surface.

Some glacial drift was washed out with the melt-waters. The coarsest material, or outwash, was deposited nearest the ice-front and finer material farther away. Where the outwash material was spread widely in front of the glacier it forms an outwash-plain; where the outwash material is restricted to the river valleys it forms valley-trains.

At times, especially in the winter, the outwash plains and valley-trains were exposed as the melt-waters subsided, and the wind picked up the silt and fine sand from their surfaces, blew it across the country, and dropped it to form deposits of loess. Glacial loess mantles much of

Illinois. Loess is thickest near large river valleys, which served as avenues of movement for the great discharge of water and outwash materials. Some loess deposits are as much as 80 feet thick, especially on the east side of the valleys. The thickness diminishes as one goes farther away from the valleys. In this region the loess is measured only in inches.

There were four periods of glaciation during the Pleistocene. Between these long glacial times there were inter-glacial periods. During each period of glaciaion there were a number of advances and retreats of the ice front. Evidence of this lies in the great number of moraines that cover the northeastern two-fifths of Illinois.

The Shelbyville moraine, which is typically developed in the vicinity of Shelbyville marked the greatest or fartherest advance of the Wisconsin glacial stage. The succeeding moraines within the Shelbyville mark the position of the ice after receding from the position it had previously reached.

The surface relief of moraines is generally greater than that of the drift-plains. This undulatory surface is generally referred to as swell-and-swale topography. If the morainal surface shows a greater irregularity, the term knob-and-kettle topography is used. Often the outer slope of the moraine is interrupted by valleys which marked the courses of glacial streams.

We have just crossed a sub-glacial channel on this moraine. In the area south of Collison we will see another excellent development of a sub-glacial channel. A sub-glacial channel was formed beneath the ice by stream action during the development of a moraine. During this process the stream cut a valley through and upon the moraine. Morainic topography continues all the way down the valley slopes of the sub-glacial channel.

We are stopped on the Urbana moraine; the other moraines lying to the area immediately south of this region are the Champaign, West Ridge, and farther south the Cerro Gordo. To the north in the immediate area are the Bloomington, Normal, and the Cropsey moraines.

When the glacier began to recede melt-waters generally accumulated in local ponds or small lakes between the ice-front and the last moraine formed, except where there were channels cutting the moraine through which the melt-waters could drain. In some instances large lakes were formed before drainage was sufficiently developed to carry away the waters.

0.5	3.7	Caution, rough bridge. We are crossing a sub-glacial channel.
0.0	3.7	Caution, cross roads.
0.5	4.2	Slow, turn left (north).
0.8	5.0	Caution, rough bridge (sub-glacial channel).
0.2	5.2	Slow, turn right and left (north).
0.4	5.6	Caution, railroad crossing (one pair of tracks).
0.3	5.9	Slow, rough bridge (sub-glacial channel).
0.3	6.2	Stop, dangerous intersection. Enter highway with caution. Turn left (west).

0.2 6.4 Slow, turn right (north). This is the drift plain of the Urbana moraine, with post-Urbana deposits.

0.8 8.2 Floodplain on right.

0.1 8.3 Turn left, slow, cross Salt Fork River.

0.1 8.4 STOP NO. 2. Soil profile, Urbana till and Champaign till.

In this exposure we see the soil developed upon the Urbana till, which in turn lies upon a band of silt of either pro-Urbana or post-Champaign age, which in turn lies upon Champaign till.

The floodplain of the Salt Fork River is nicely shown to the south. The Salt Fork handled the outwash of the Bloomington moraine.

0.3 8.7 Slow, turn right. Note the red silt resting on gravel which lies upon Urbana till - exposure on right, across ditch.

0.8 9.5 Caution, cross road, turn left (north). Note the kame on the northeast corner of the intersection. We are still on the Urbana drift-plain.

2.1 11.6 STOP. DANGEROUS INTERSECTION. CROSS ROUTE 150, enter Route 49, continue north. The outwash of the Bloomington moraine reaches almost as far south as Route 150 in this immediate area.

2.3 13.9 Note gravelly nature of till and also the soil profile on the left.

2.5 16.4 Note the ridge ahead (Bloomington moraine).

0.5 16.9 Note the abandoned gravel pit on the left. The gravel is the outwash from the Bloomington moraine, which lies to the north.

0.3 17.2 STOP NO. 3. Examination of the soil and silty outwash which overlies the outwash gravel of the Bloomington moraine.

The farm land in the outwash plain is of excellent quality, as is evidenced by the rich soil in the soil profile. Excellent drainage of the soil is possible because of the gravelly subsoil.

0.2 17.4 Note the silt on the coarse Bloomington outwash gravel, which in turn overlies the Urbana till.

0.4 17.8 Note the profile of Bloomington till on the left side of the road.

1.9 19.7 STOP NO. 4.

The soil profile which we see here is derived from the weathering of glacial materials, whether loess, silt or glacial till. In this area the thickness of the soil varies widely because of relative position and freedom from erosion.

The section is as follows:

	Ft.	In.
Zone A - Dark silty, humic soil		10
Zone B - Deeply weathered till, brown grading to yellow, non-calcareous, no lime pebbles	2	
Zone C - Till, yellow, very calcareous, limestone pebbles	6	

Rocks and minerals suffer changes when they are exposed to the weather. These physical and mineralogical changes though slow become evident when earth deposits remain undisturbed for long periods of time. This happens in the development of a soil profile.

Following the practice established about 30 years ago by the Russian Glinka, soil scientists usually consider that the soil or weathering profile consists of 3 zones, designated A, B, and C from the top down. The A zone is the "soil" zone, which is normally black or gray in color. The B zone is the "subsoil" zone, and the C zone is the unaltered parent material.

The zonal effect results from the fact that the four principal processes which effect soil weathering all progress with the downward movement of groundwater but at different rates. These processes, listed in order according to their rate of progress, beginning with the most rapid are: (1) oxidation, (2) leaching of carbonates, (3) decomposition of more resistant minerals, and (4) accumulation of humus.

As a result, in the A zone, in which the humus material derived from decaying plants has accumulated, the rocks are oxidized, leached, and decomposed. In the upper part of the B zone, they are oxidized and leached, while in the lower part of the B zone they are only oxidized. The oxidation zone is shown by the reddish or yellowish color resulting from the oxidation of iron minerals. The leached zone is determined by the absence of carbonates, as revealed by tests with a solution of hydrochloric acid.

0.2	19.9	At Y in road, proceed ahead.
0.2	20.1	At crest of Bloomington moraine. Note view to northeast down the long back slope of the moraine and the undulatory character of the moraine.
3.6	23.7	Slow, turn right (south).
0.1	23.8	Slow, turn left (east).
0.1	23.9	Note the meanders of stream on right.
0.6	24.5	Caution, entering village of Collison. Side road on left, railroad crossing.
0.4	24.9	Note till profile on right and erosion on left.
0.1	25.0	Turn right (south).
1.2	26.2	In the bottom of an old sub-glacial channel. Streams flow north from here as well as south through the Bloomington moraine.
1.6	27.8	Note the excellent view of the sub-glacial channel on the right.
0.1	27.9	Slow, turn left (east).
0.7	28.6	On crest of Bloomington moraine.
0.8	29.4	Slow, turn right (south). Note the dissection of the surface here because of the proximity to the Middle Fork of the Vermilion River.
0.9	30.3	Entering Newtown.
0.3	30.6	We are going down the outer slope of the Bloomington moraine. Note the excellent view to the southwest across the outwash plain.
1.3	31.9	Slow, winding road. Entering the village of Glenburn.
0.2	32.1	Caution, turn left (east) at foot of hill. Follow road into Kickapoo State Park. Note the flat valley bottom of Glenburn Creek and the gravelly till along the road cuts.

0.9	33.0	Note the sandstone on the left and right. The bedrock in this area is of Pennsylvanian age.
0.2	33.2	Enter Kickapoo State Park.
0.2	33.4	Slow, cross bridge over Middle Fork.
0.2	33.6	Note the gravel on bedrock on left. Gravel pit on the right.
0.4	34.0	Stop, continue ahead.
0.3	34.3	Turn right and park. STOP NO. 5. LUNCH! Continue ahead along winding road.
0.4	34.7	Stop, turn left.
0.1	34.8	Turn right.
0.1	34.9	Stop, continue ahead.
0.1	35.0	Note channel in terrace on left cut into Bloomington outwash.
0.3	35.3	Note buff-colored silt on right.
0.1	35.4	Turn left.
0.2	35.6	STOP NO. 6.

This shale is deeply weathered and the normal gray color changed to a greenish gray. Overlying the shale in some places is a silt which is either pro-Illinoian or early Illinoian. The overlying pinkish till is of Illinoian age. At this locality no Sangamon soil has been found.

In a portion of the outcrop you will find a heavily oxidized gravel which we will call Illinoian. Overlying this lies a brownish gray silt which carries fossil plant stems. This silt we call the Farmdale or earliest Wisconsin stage of glaciation.

The Shelbyville till is also pinkish and is several feet thick. In some places a thin silty layer separates the Shelbyville from the overlying till. The next till may be composed of Cerro Gordo, West Ridge, Champaign, or Urbana tills. In some places faint differences in the tills may be observed in this exposure. You will note that in places it contains sand and gravel lenses, as well as laminated till. This feature is referred to as glacio-fluviatile.

Overlying this is a persistent brownish-gray silt band referred to as pro-Bloomington. The drift immediately below the surface is Bloomington till, which only reaches as far south as the black-top road only a few hundred years to the south. As we approach the road note the Bloomington outwash in the form of gravel lying beneath the surface.

0.2	35.8	Make U turn.
0.6	36.4	Stop, cross highway. Enter strip mine road.
0.1	36.5	Turn left (east) on mine road.
0.6	37.1	STOP NO. 7. View of stripping operation of the Harmattan mine of the Fairview Collieries Corporation.

Section for Stop 6.

Wisconsin	Bloomington	Soil Gravel Till
	Pro-Bloomington	Silt
	Urbana Champaign West Ridge Cerro Gordo	Yellow and gray till with lenses of gravel and silt.
	Shelbyville	Pink till
	Farmdale	Silt
Illinoian	Illinoian (Pro-Illinoian or Early Illinoian)	Gravel - oxidized Pink till Silt Weathered Pennsylvanian shale

The sequence here is as follows:

	Ft.
Undifferentiated till, similar to the till observed across the road.	50
Shale of Pennsylvanian age	30
Coal, called No. 7	5-6
Underclay	1
Coal, No. 7	1-2

All bedrock exposures found in Vermilion County are of Pennsylvanian age. In fact, all of the rocks belong to either the Carbondale or McLeansboro Group. In our trip today we are concerned only with the rocks of Upper Pennsylvanian or McLeansboro age.

There are two minable coals in this area, the No. 7 which is being mined at the Harmattan Mine, and the Grape Creek which finds its best development in the vicinity of Westville, Catlin, and Georgetown.

The No. 7 coal has been extensively strip mined in Vermilion County, beginning around 1920 and continuing until 1927. During the last ten years two large strip operations have been mining this coal. Since coal was first mined in the Danville area more than 40 million tons have been mined by strip and underground methods. More than 17 square miles have been mined.

The No. 6 or Grape Creek coal has been mined extensively by the underground method. At present, there is but one operation in the No. 6 seam. More than 53 square miles of this coal have been mined since 1850, or approximately 110 million tons.

As to reserves of minable coal in the Vermilion County, there remain approximately two billion tons of minable coal in the No. 7 coal bed and more than 700 million tons in the No. 6.

Danville has been famous for the bricks produced in this area. The shale extensively used is the roof shale of the No. 7 coal. This shale finds other uses in the manufacture of haydite, a light weight aggregate used in concrete and for making building blocks.

We shall see shale, sandstone, limestone, clay, and conglomerate later in the day.

It is generally accepted that rocks of Pennsylvanian age occur in similar sequences. This sequence is called a cyclothem. The attached sheet shows the ideally perfect cyclothem, however, all ten members are seldom present.

It is not possible for us to tell you just why we have more than 50 of these cycles of sedimentation during the Pennsylvanian Period. Probably the central portion of the country was a vast swampy region, sometimes marine, lagoonal, swampy, and terrestrial. We have evidence indicating that the marine seas advanced from the west. Much of the time this vast area received sediments in the form of fine mud which later became shale, sand which became sandstone, plants which became coal, and lime mud which became limestone. The basin in which the sediments were being received continued to sink. Ultimately a considerable thickness of shale, sand, clay, coal, and limestone had accumulated. All this happened more than 250 million years ago. When the end of the Pennsylvanian Period came, we have reason to believe that no more sediments were received in this area for more than 100 million years.

We shall see in the next two outcrops some of the features of limestone, coal, underclay, sandstone, and shale.

1.3	38.4	Slow, turn right (south). Note the coal preparation plant of the Harmattan Mine on the left.
0.9	39.3	Caution, railroad crossing in Hillery.
0.1	39.4	Stop, turn right entering Route 150. Hill ahead is a kame.
1.7	41.1	Middle Fork River.
2.6	43.7	This area is in the outwash plain of the Bloomington moraine.
3.1	46.8	Cross Stony Creek, one of the streams which handled discharge waters from the Bloomington moraine.
0.4	47.2	Terrace deposits in valley of Stony Creek.
0.1	47.3	Waste pile of abandoned coal mine in the No. 7 coal. The coal here lies at a depth of 190 feet.
0.1	47.4	Muncie. Caution, road intersection.
0.5	47.9	Slow, turn left (south).
1.2	49.1	Slow, turn right (west).
0.5	49.6	Slow, turn left (south).
0.8	50.4	Slow, bumpy culvert. Note the silt on the till in the road cut on the right and left.
1.1	51.5	Slow, entering valley of the Salt Fork River.
0.1	51.6	Slow, crossing Salt Fork River.
0.0	51.6	STOP NO. 8. Here we have an excellent section of Urbana till on Pennsylvanian bedrock.

The section here is as follows:

	Ft.	In.
Silty soil	2	
Gravelly till	3	
Till, buff	8-10	
Till, gray firm structured	10	
Sandstone, medium gray, micaceous, cross-bedded, carbonaceous, with an irregular base. Conglomeratic at the lower contact	15	
Shale, gray		3-10
Limestone, gray, impure, fossiliferous	1	
Shale, dark gray		6
Coal zone		6
Underclay, light gray, soft, plastic	2	
Covered interval		

The sandstone rests unconformably upon members of the underlying cycle of deposition.

1.2	52.7	Stop, cross pavement with caution.
0.3	53.0	Caution. Danger, railroad crossing.
1.8	54.8	Crest of Urbana moraine. Looking down the front slope and the outwash plain ahead.

1.3 56.1 Slow, turn left (east).

1.1 57.2 STOP NO. 9. South end of Fairmount quarry.

The limestone is of Pennsylvanian age, and is called the Livingston limestone. Most limestones are of marine origin and the fossils to be found here are indicators of marine conditions for the Livingston. You will find brachiopods, bryozoa, corals, crinoid and echinoid remains here. You will note the parallel scratches or grooves cut into the smooth upper surface of the limestone. The limestone was smoothed and grooved by pebbles beneath the ice when the glaciers covered this area.

GEOLOGIC COLUMN - HOMER AREA

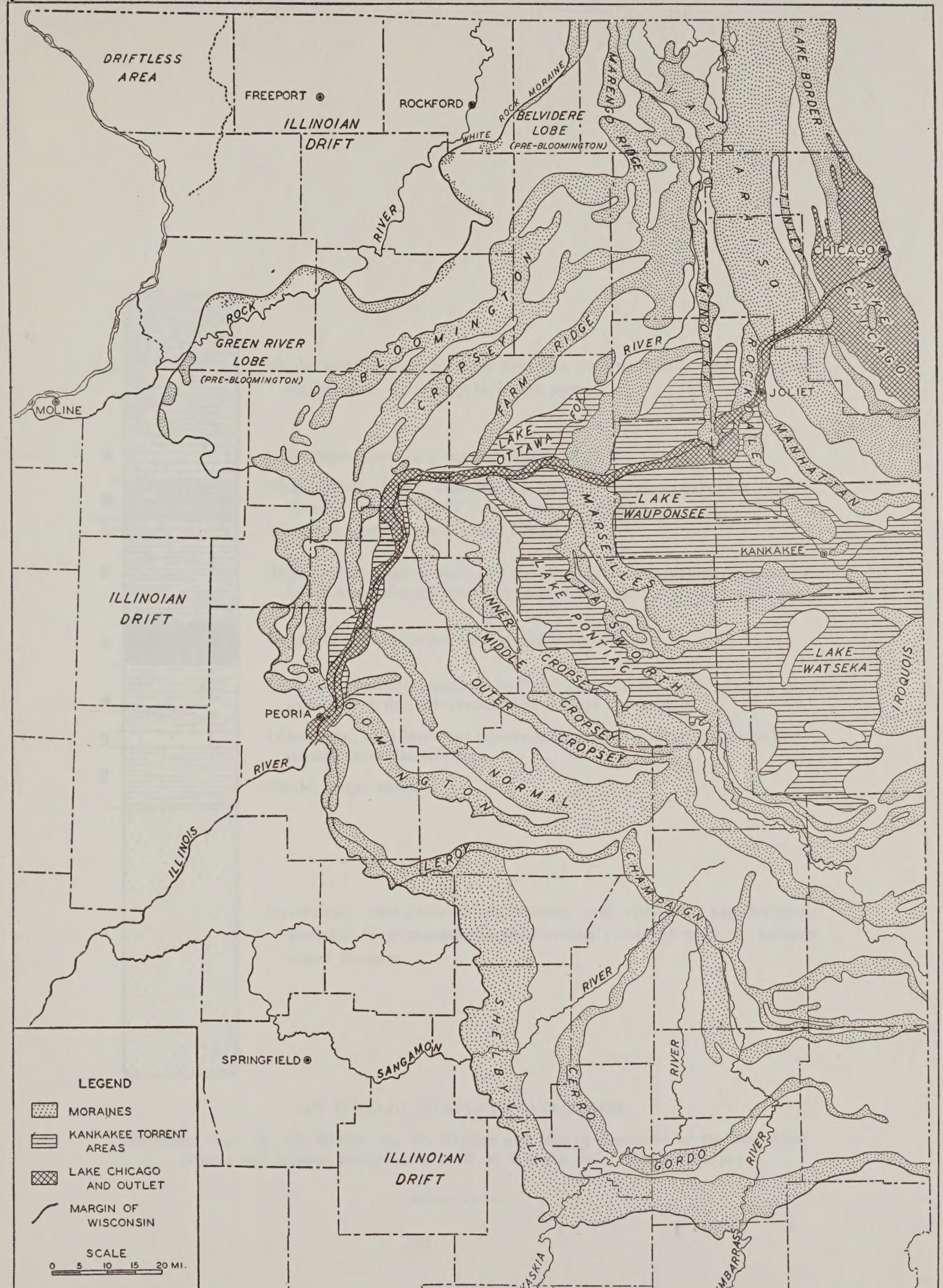
ERAS		PERIODS	EPOCHS	REMARKS
Cenozoic "Recent Life"	Age of Mammals	Quaternary	Pleistocene	Recent post-glacial stage Wisconsin glacial stage Sangamon interglacial stage Illinoian glacial stage
		Tertiary	Pliocene Miocene Oligocene Eocene Paleocene	Not present in the Homer area
Mesozoic "Middle Life"	Age of Reptiles	Cretaceous		Not present in the Homer area
		Jurassic		Not present in Illinois
		Triassic		Not present in Illinois
Paleozoic "Ancient Life"	Age of Amphibians and Early Plants	Permian		Not present in Illinois
		Pennsylvanian	McLeansboro	Livingston (Fairmount) limestone Lonsdale limestone Danville (No. 7) coal bed
			Carbondale	Grape Creek (No. 6) coal
			Tradewater	In deep wells only
			Caseyville	In deep wells only
		Mississippian	Iowa (Lower Mississippian)	Chiefly shales found in deep wells in Homer area
	Age of Fish	Devonian		Dark shales and limestones in deep wells
	Age of Invertebrates	Silurian		No data available
		Ordovician		No data available
		Cambrian		No data available
Proterozoic Archeozoic		Referred to as "Pre-Cambrian" time		No data available

Time Table of Pleistocene Glaciation
(after M. M. Leighton and H. B. Willman, 1950)

Stages	Sub-stages	Nature of Deposits	Special Features
Recent		Soil, infant to youthful profile of weathering, lake and river deposits, dunes, peat.	
Wisconsin (4th glacial)	Mankato: Late	Fluvial deposition - Mississippi, Illinois, and Ohio river valleys; dune sand, some loess deposits along Mississippi River Valley; and deposits in Lake Chicago.	Lake Agassiz Torrent eroded Late Mankato deposits
	Mankato: Early		Lake Duluth Torrent eroded Early Mankato deposits
			Forest bed, Two Creeks, Wisconsin
	Cary	Drift, loess, dunes, beginning of deposits in Lake Chicago	Kankakee and Lake Maumee Torrents
	Tazewell	Drift, loess, dunes, lake deposits.	Fox River Torrent Westward diversion of Mississippi River into Iowa by Tazewell ice lobe
		Till and gravel	Chatsworth) Inner
		Till and gravel	Cropsey) Middle) Outer
		Till	Normal
		Till	Bloomington
		Silt	Pre-Bloomington
		Till	Urbana
		Till	Champaign
		Till	West Ridge
		Till	Cerro Gordo
		Till	Shelbyville
	Iowan	Drift, loess, dunes	
	Farmdale (Pro-Wis.)	Loess (in advance of glaciation)	
Sangamon (3rd interglacial)		Soil, mature profile of weathering, alluvium, peat	
Illinoian (3rd glacial)	Buffalo Hart	Drift	
	Jacksonville	Drift	
	Payson (terminal)	Drift	
	Loveland (Pro-Ill.)	Loess (in advance of glaciation)	

Time Table of Pleistocene Glaciation (cont.)

Stages	Sub-stages	Nature of Deposits	Special Features
Yarmouth (2nd interglacial)		Soil, mature profile of weathering, alluvium, peat	
Kansan (2nd glacial)		Drift Loess	
Aftonian (1st interglacial)		Soil, mature profile of weathering, alluvium, peat.	
Nebraskan (1st glacial)		Drift	



GLACIAL GEOLOGY IN NORTHEASTERN ILLINOIS
Compiled by George E. Ekblaw from data furnished by the Survey
January 1, 1942

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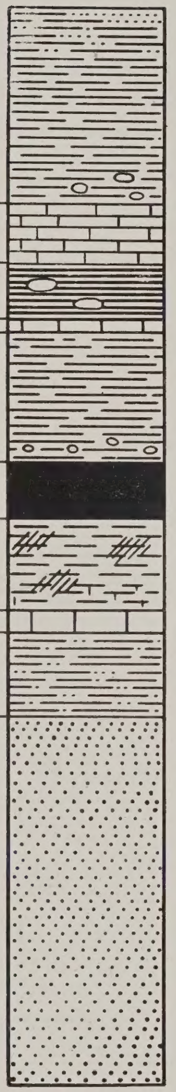

10 Shale, gray, sandy at top; contains marine fossils and ironstone concretions especially in lower part.

9 Limestone; contains marine fossils.

8 Shale, black, hard, laminated; contains large spheroidal concretions (''Niggerheads'') and marine fossils.

7 Limestone; contains marine fossils.

6 Shale, gray; pyritic nodules and ironstone concretions common at base; plant fossils locally common at base; marine fossils rare.

5 Coal; locally contains clay or shale partings.

4 Underclay, mostly medium to light gray except dark gray at top; upper part noncalcareous, lower part calcareous.

3 Limestone, argillaceous; occurs in nodules or discontinuous beds; usually nonfossiliferous.

2 Shale, gray, sandy.

1 Sandstone, fine-grained, micaceous, and siltstone, argillaceous; variable from massive to thin-bedded; usually with an uneven lower surface.

AN IDEALLY COMPLETE CYCLOTHEM

(Reprinted from Fig. 42, Bulletin No. 66, Geology and Mineral Resources of the Marseilles, Ottawa, and Streator Quadrangles, by H. B. Willman and J. Norman Payne)

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